Effect of Maternal Dietary Yeast Supplementation during Late Gestation and Early Lactation on Foal Growth and Development from Birth to Weaning

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ABSTRACT

Dietary yeast supplementation in horses has been reported to influence nutrient digestibility and milk production in mares. Altering the nutrient composition of the milk from mares may influence the growth of their foals. The objective of this study was to determine if dietary yeast supplementation of the maternal diets would influence foal growth and development. Eight Quarter Horse mares (14.5 ± 7.5yr) were randomly assigned to one of two groups: Yeast or Control. All mares received 0.5% BW of a 16% CP pelleted concentrate, with water and mixed grass hay *ad libitum*. Mares in the yeast treatment group were fed a targeted dose of 1 g/ 45.4 kg of BW per day of a live culture of *Saccharomyces cerevisiae* for a period of 180 d. Growth measurements (body weight, body length, heart girth, wither and hip height, upper and lower leg length, and front/rear cannon bone circumference) were taken on d 0, 7, 14, 21, 28, 35, 42, 49, 56, 70, 84, 98, 112, 126, 140, 154 and 168. Data were analyzed using the PROC Mixed procedure of SAS. Average daily gain (ADG) of the foals was not influenced by the addition of yeast to the maternal diets. Hip height and wither height were highly correlated (r = 0.99). Although upper leg length and wither height were highly correlated (r = 0.93), lower leg length and wither height were not (r = 0.72). No significant differences in foal growth and development due to dietary yeast supplementation of the maternal diets were observed in this study.

INTRODUCTION

Probiotics are microorganisms that provide beneficial effects to the host organism other than those of nutritive value and have been found to promote stabilize the GI tract, improve

nutrient utilization, and regulate a healthy immune response in horses (Yoon and Stern, 1995; Fuller, 1989; Swyers et al, 2008; Guarner and Schaafsma, 1998). Prebiotics are selectively fermented ingredients that allow specific changes of the gastrointestinal microflora that would promote better health and wellness of the host and, like prebiotics, have been found to stabilize the GI microflora while providing other positive effects to the host animal (Gibson et al., 2004; Konstantinov et al., 2004).

Research has shown that maternal diet impacts many physiological aspects of the fetus. In humans, the mother's diet has been shown to influence growth of the newborn (Clapp et al., 2002). Previous research has indicated that the protein content of a mare's diet can influence growth in their foal, suggesting that maternal diet is fundamental to a newborn foal's overall health and wellness (van Niekerk and van Niekerk, 1997). Live yeast is considered as either a probiotic or a prebiotic and has been shown to increase nutrient utilization in horses (Jouany et al., 2008). By supplementing the mare with live yeast, the foal may absorb nutrients more efficiently therefore improving the overall health and gain of that foal. However, the effects of maternal dietary yeast supplementation on foal growth have not yet been studied.

MATERIALS AND METHODS

Eight pregnant Quarter Horse mares (14.5 ± 7.5yr) were randomly assigned to one of two groups: Yeast or Control. All mares received 0.5% BW of a 16% CP pelleted concentrate, with water and mixed grass hay *ad libitum*. Mares in the yeast treatment group were fed a targeted dose of 1 g/ 45.4 kg of BW per day of a live culture of *Saccharomyces cerevisiae* for a period of 180 d (d 250 of gestation to 90 d post-foaling). Growth measurements (body weight, body

length, heart girth, wither and hip height, upper and lower leg length, and front/rear cannon bone circumference) were taken on d 0, 7, 14, 21, 28, 35, 42, 49, 56, 70, 84, 98, 112, 126, 140, 154 and 168. Data were analyzed using the PROC Mixed procedure of SAS.

RESULTS

There were no significant differences between foal growth measurements at any point from birth to weaning due to dietary yeast supplementation of the maternal diets during late gestation and early lactation (Figures 1-9). There were also no significant differences in the average daily gain (ADG) of foals due to the addition of live yeast to the maternal diet. Correlations between growth measurements are shown in Table 1. Foal body weight was strongly positively correlated to heart girth and body length (r = 0.99 and 0.97, respectively). Wither height was strongly positively correlated to hip height, upper leg length and lower length (r = 0.99, 0.93 and 0.72, respectively).

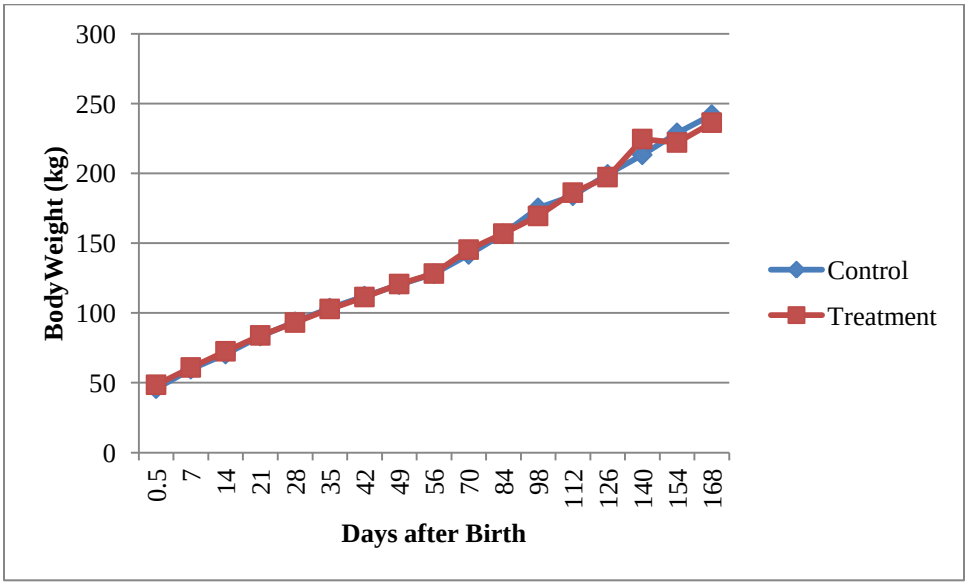

Figure 1. Effect of maternal dietary yeast supplementation during late gestation and early lactation on foal body weight from birth to weaning.

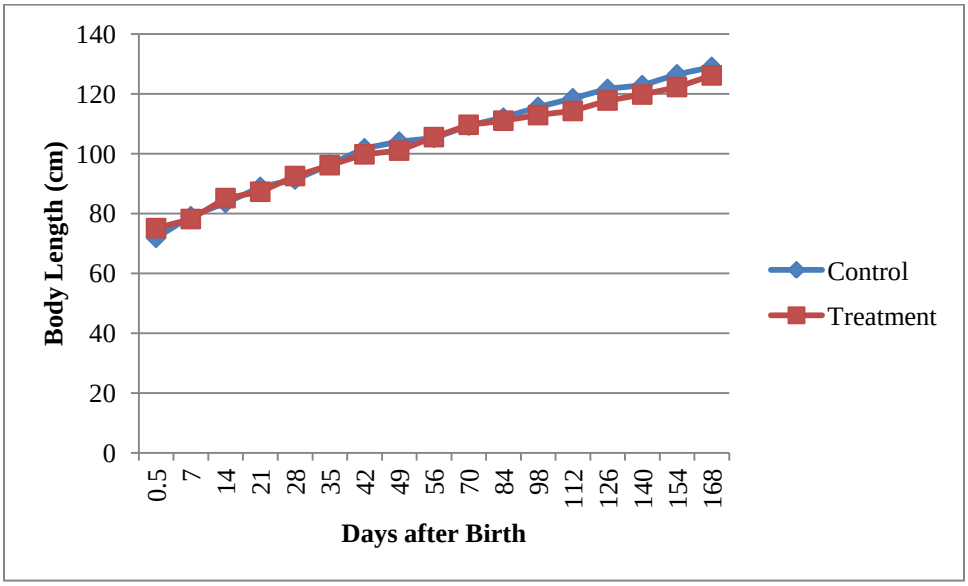

Figure 2. Effect of maternal dietary yeast supplementation during late gestation and early lactation on foal body length from birth to weaning.

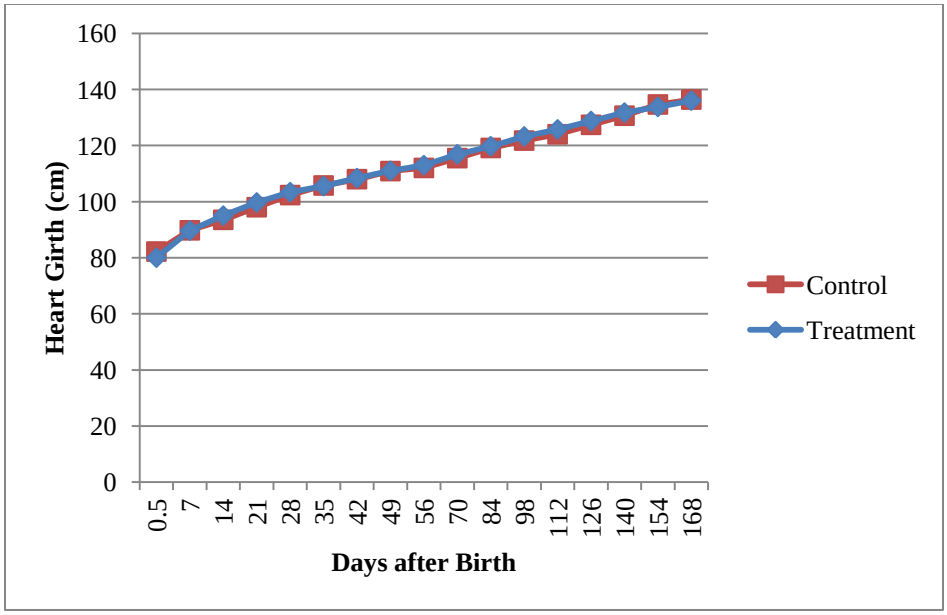

Figure 3. Effect of maternal dietary yeast supplementation during late gestation and early lactation on foal heart girth from birth to weaning.

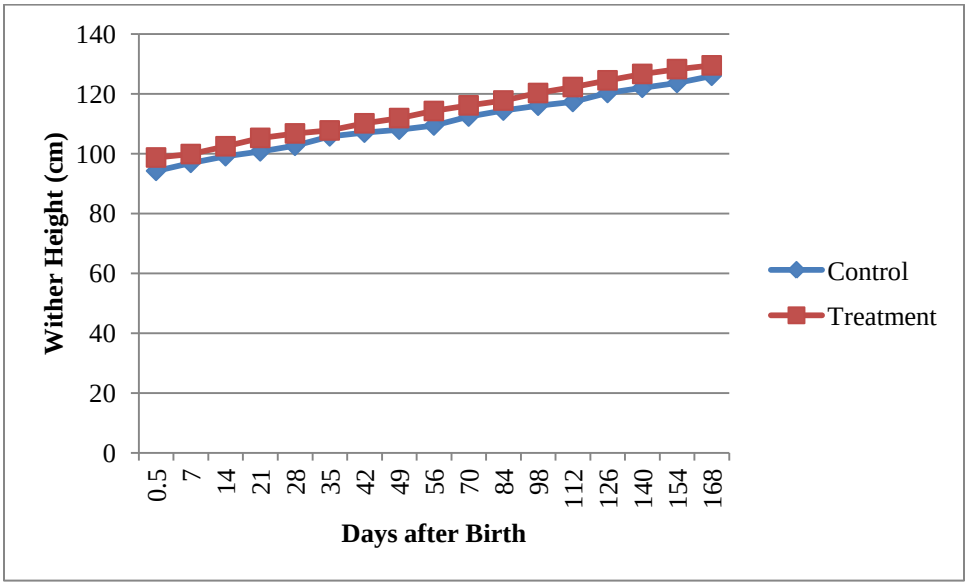

Figure 4. Effect of maternal dietary yeast supplementation during late gestation and early lactation on foal wither height from birth to weaning.

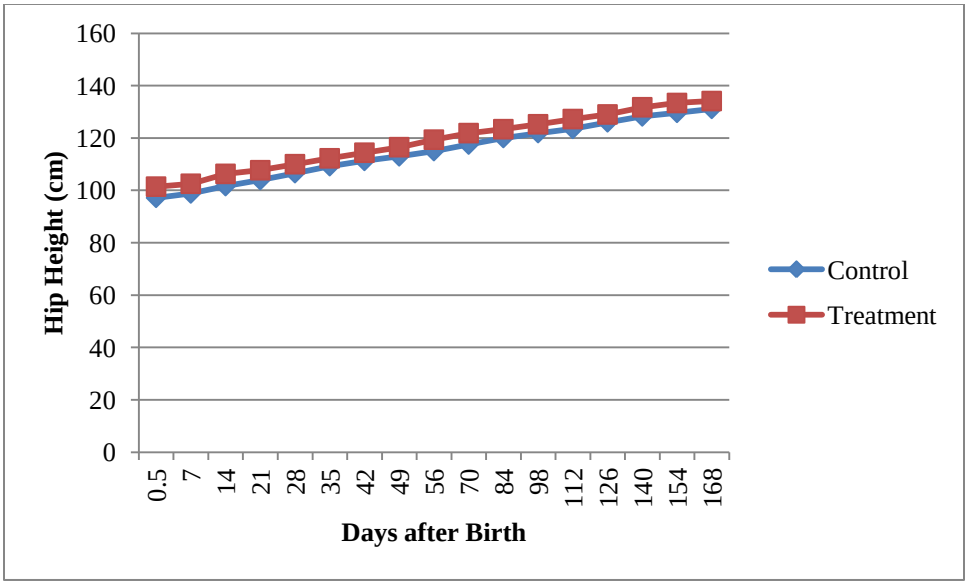

Figure 5. Effect of maternal dietary yeast supplementation during late gestation and early lactation on foal hip height from birth to weaning.

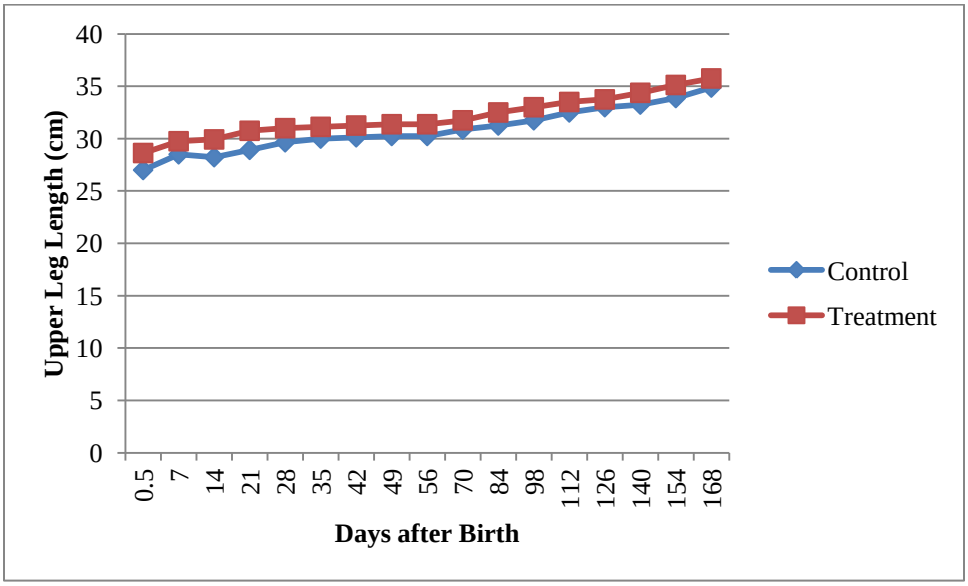

Figure 6. Effect of maternal dietary yeast supplementation during late gestation and early lactation on upper leg length from birth to weaning.

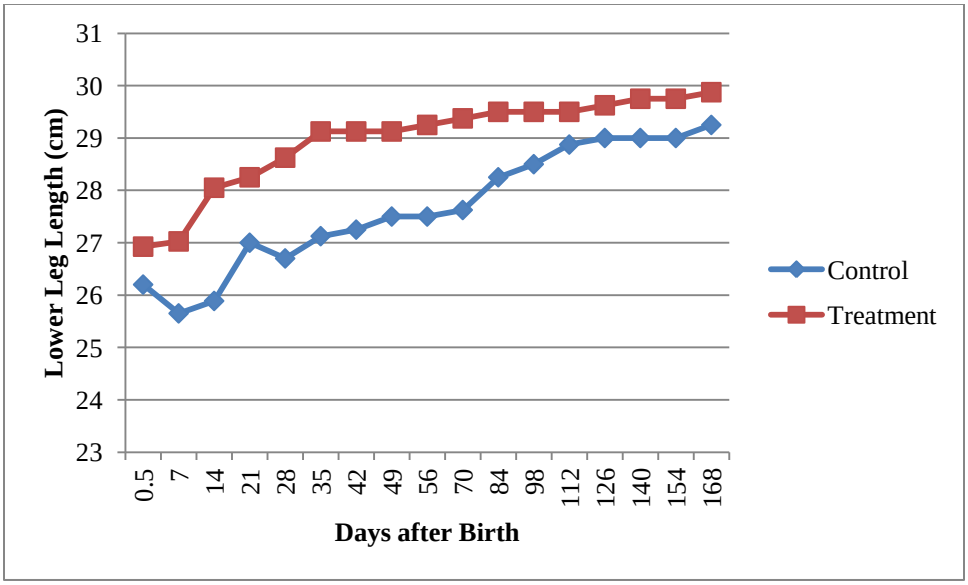

Figure 7. Effect of maternal dietary yeast supplementation during late gestation and early lactation on foal lower leg length from birth to weaning.

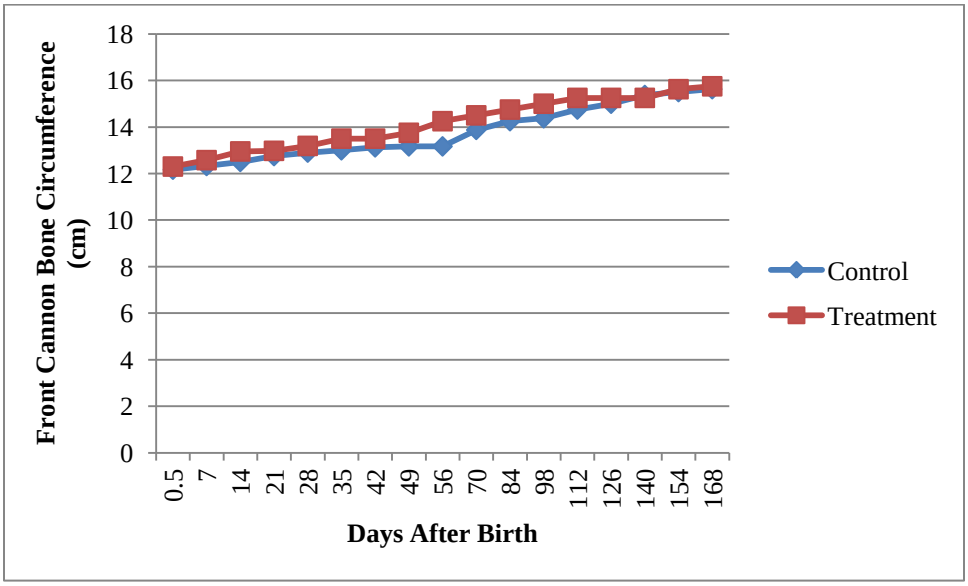

Figure 8. Effect of maternal dietary yeast supplementation during late gestation and early lactation on foal front cannon bone circumference from birth to weaning.

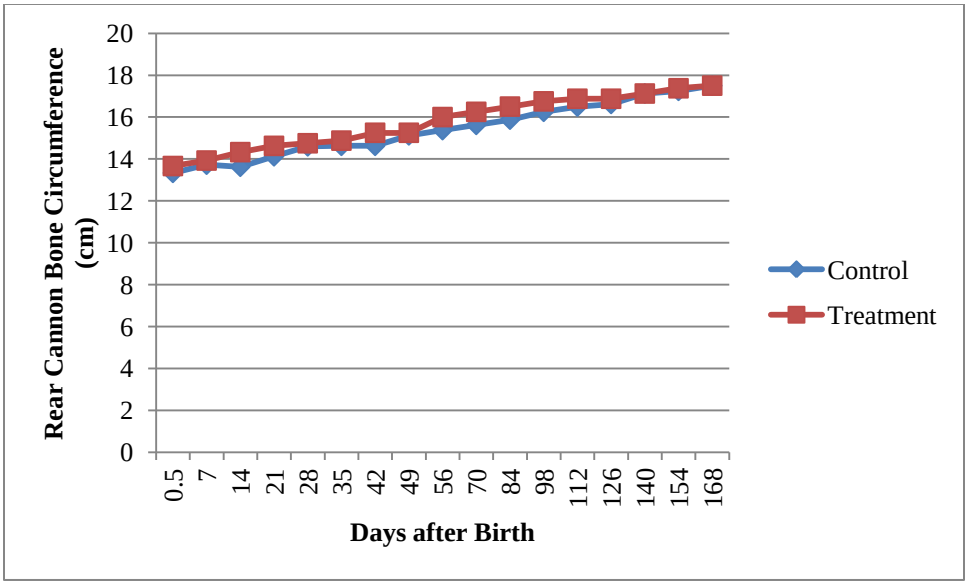

Figure 9. Effect of maternal dietary yeast supplementation during late gestation and early lactation on foal rear cannon bone circumference from birth to weaning.

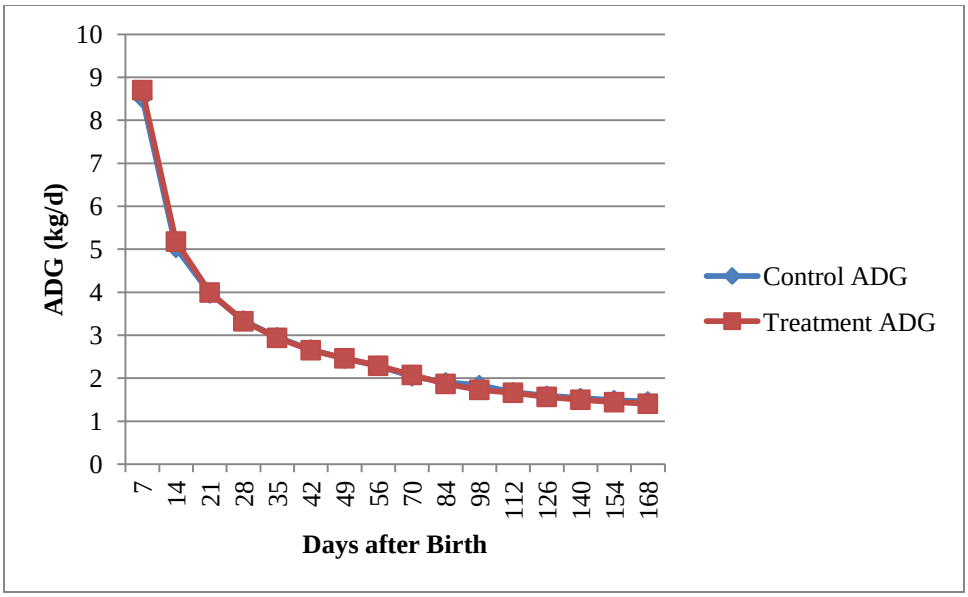

Figure 10. Effect of maternal dietary yeast supplementation during late gestation and early lactation on foal average daily gain from birth to weaning.

Table 1. Correlation (r^2) between foal growth measurements from birth to weaning.

	ADG (kg/day)	HG (cm)	BL (cm)	HH (cm)	UL (cm)	LL (cm)
BW (kg)	-0.67	0.98	0.97	-	-	-
HG (cm)	-0.71	-	0.98	-	-	-
WH (cm)	-	-	-	0.99	0.93	0.72
LL (cm)	-	-	-	-	0.71	-

DISCUSSION

The addition of live yeast to the diet of mares during late gestation and early lactation did not influence the growth of their foals in this study. This is in contrast to previous research in which the foals of mares fed *Saccharomyces cerevisiae* during late gestation and early gestation grew significantly better than foals of untreated mares (EFSA, 2009). One possible explanation

for these differences may be the dosage level of yeast added to the mares' diets. In the two studies in which the addition of yeast to the mares' diet significantly increased foal growth, the mares were fed 20g/head/day which is twice the amount of yeast fed to mares fed in the present study. The addition of *Saccharomyces cerevisiae* to mare diets has also been reported to increase nutrient digestibility and milk production in the mares as well as increase nutrient retention in the foals.

Although the addition of live yeast to the diet of mares during late gestation and early lactation did not influence the growth of their foals in this study, it would be advantageous to analyze the milk composition of the mares as well as examine the microbial diversity of mare and foal fecal samples of both the foals and mares to see if there are any differences due to treatment.

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